

## LETTERS TO THE EDITOR.

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## Cross-fertilisation of Sweet-peas.

It is unnecessary, I think, to cite more than one of the recent statements with regard to sweet-peas, though I can provide others. Sir Francis Galton in his just issued "Memories" (p. 300) writes:—

"After much consideration and many inquiries, I determined in 1885, on experimenting with sweet-peas, which were suggested to me both by Sir Joseph Hooker and Mr. Darwin. Their merits are three-fold. They have so little tendency to become cross-fertilised that seedsmen do not hesitate to grow differently coloured plants in neighbouring beds. . . ."

I must thank Mr. Francis Darwin (p. 308) for his reference to the "Cross- and Self-fertilisation." On the page he refers to Charles Darwin writes:—"Why, then, do not the varieties occasionally intercross, though this would not often happen, as insects so rarely act in an efficient manner?" and again, "Whatever the cause may be, we may conclude, that in England the varieties never or very rarely intercross." These are the views which evidently Charles Darwin communicated to Sir Francis Galton.

My point is that *now* they do intercross, and that varieties cannot with safety be kept in neighbouring beds. Mr. Wright, the superintendent of the Royal Horticultural Society's Garden at Wisley, told an inquirer in 1907, as to his experience *re* sweet-peas, that he had no doubt there was some English insect that cross-fertilised them, and that in trying new sorts the gardeners had to place the rows in different parts of the garden to minimise the risk as much as possible. Charles Darwin, in the passage referred to, says that "on two or three occasions," he saw *Megachile* in the act of depressing the keel, and he notes that these bees had the undersides of their bodies thickly covered with pollen. My point is that hourly every day these bees came in large numbers; their visits were not occasional, but persistent and effectual; I never saw a hive bee, although they frequently tried, successful. *Megachile* may, in the course of forty years, have developed the habit much more completely. The purport of my letter was merely to suggest to those growing sweet-peas that there is no security that they will be self-fertilised if *Megachile* be frequent.

I should like to add that "The Original  $\pi$ " is by no means the first  $\pi$  who has contributed to the columns of NATURE! The  $\pi$ 's are a large and talkative species.

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## The Village Institute and its Educational Possibilities.

THE growth of social life in villages during the last few years has been fostered by the erection of village institutes, halls, and reading-rooms, and yearly such institutions are becoming more numerous. Has the educational life of the village been fostered by their growth?

The majority of these institutions cater for games and recreation, together with a supply of reading matter of the daily paper and monthly magazine type. The presence of the latter indicates a desire on behalf of the management or the donor of the institute to devote at least part of the work of the institute to educational purposes. In many institutes the reading-room is little frequented and has the least share of the members' time, whereas the billiard-room, where long visits are the rule, invariably presents a scene of congestion.

To a certain extent the village institute is a replica of the mechanics' institute of the towns and urban districts; both serve as a meeting place for members, and supply opportunities for recreation and self-improvement to them.

The mechanics' institutes were, in their earliest days, the housing place of evening classes in science, art, and languages, but the growth of continuation education has led to the general abandonment of the mechanics' institutes for systematic class instruction and the provision of

special buildings. Courses of lectures of a more or less educational character still remain at the mechanics' institutes—remnants of their early educational efforts. The mechanics' institute is a model upon which the village institute might shape its policy and methods, so becoming a centre of educational activity.

As a result, we find that several village institutes, like their town compeers, give courses of lectures. Such subjects as agriculture, horticulture, poultry-keeping, bee-keeping, and other rural industries are so treated, but, generally speaking, the village institutes have never attempted to take up the work of systematic evening education, as the mechanics' institutes did, fitted to the environment of the villager.

The future of an individual is as much a problem for the "powers that be" in a rural community as it is in the urban district, town, or city. This future is not thoroughly and properly catered for by providing the individual with games and recreation to the exclusion of provision for craft-work and intellectual training for his daily work. Why should not the village institute help in the intellectual development of villagers, keeping them mentally elastic and manually efficient by suitable educational work?

If the institute cannot provide suitable educational provision on account of lack of funds, it certainly should not, by its rules of membership or otherwise, be an obstacle in the way of other institutions which take up evening classes.

The younger members of rural communities, as in towns, after leaving day school generally display no further interest in their own education, and their elementary education equipment begins to rust.

In the towns we appeal to the employer to look after the welfare of the youth by asking him to see they attend the evening school. In the villages the same appeal may be made by way of the village institute. The appeal in each case would cease if continuation work became compulsory, but as at present compulsion is not a part of either political party's programme, we must look to other means. It may be said there would be no resting and rusting of the villager if there were an evening continuation school in the village, a statement which brings one to the *raison d'être* of the present letter on village institutes.

The village institute has usually no restrictions concerning the admission of a youth when he applies to become a member. It would not be necessary to advocate a restriction if institute managers had, as a condition of membership, told the would-be member that the institute would be closed to him on those nights the evening school was open. It would not be too drastic to tell the would-be member that up to eighteen years of age he would be expected to attend the evening classes held in the village. In small villages, where the number of available students for an evening school is small, the village institute should render all the help it can. A leading educationist stated before the recent Consultative Committee on Attendance at Evening Schools that there was a club where no boy was allowed to remain a member unless he attended the evening classes two nights per week. The village institutes might take up a similar definite position where evening schools are in existence.

The foregoing suggestions are made because the institute, by providing games, not only threatens the existence or birth of an evening school, but cultivates in its young members no sense of responsibility either to themselves or to the community. A curriculum of pleasure alone should be far from satisfactory for the leaders of village activity.

It may be said that an institute cannot afford financially to cripple itself by the adoption of the foregoing suggestions. My reply is that managers would find that such a regulation, prospective in nature, would not reduce applications for membership. Temporarily there might be a little resistance to the conditions, but in time applicants would become educated to the benefits of such a regulation and recognise it, as they do the payment of a fee. The authority managing the evening school might transfer the fee from the school to the institute if the student made a satisfactory percentage of school attendances. Thus the student would not be mulcted in two payments, one for the school and another for the institute.

It does appear plain that the village institutes have a fine opportunity for giving encouragement to continuation rural education; they not only miss the opportunity, but, at the same time, unwittingly are the cause of there being no demand for an evening school. Opportunities for the village youth to spend aimlessly and uselessly all their spare time are to be deprecated.

In one West Riding village the influence of the opening of a new institute was shown by the total exodus of the members of the existing evening school. Even the moral obligation to complete their attendances, so as to save financial losses upon the school, failed to bring them back again. The billiard-ball was rolling, so opportunities for the making of more fit citizens were sent flying. The result was not a moral triumph for the ex-students.

May one suggest that in the future some donor of an institute, or someone who by their contribution has made it possible for trustees to lease an institute at a nominal rent to a committee of management, should insert a proviso in their deed of gift that younger members of the institute are to attend continuation educational work at the village school? Such a proviso might be open to elimination if found, after an extended trial, to be prejudicial to the institute's success.

There should be an educational side to every village institute; it might be an attached rural association or club for the further advance of rural interests. Such an association might hold meetings periodically for discussions upon general agricultural matters. Samples of manures and feeding stuffs, along with a consideration of current values and prevalent adulterants, are important matters, and should be undertaken by the suggested rural club. The leaflets of the Board of Agriculture would be suitable for elucidation and discussion; their distribution could be carried out by the club.

Village halls have been in the past the centre of the arts and crafts movement; in some parts of the country they are yet. The development of handwork in the elementary schools of the rural districts should again revive the use of the village hall. Such a revival requires funds. The Board of Education and local authorities place at the disposal of committees doing educational work of a manual nature liberal grants. Some of the wealthy trade guilds might be disposed to find funds for a village development of arts and crafts if the work had an industrial basis. In this way might be developed in the village, as in Germany, a large number of small workshops going hand in hand with agriculture.

The village institute and evening school would not become competitors by both taking up educational work; they would become helpers. Admission to the institute's higher work should preferentially be given to those who had thoroughly prepared themselves for it by a satisfactory course of preparatory work at the evening school. In short, the institute would be regarded as the technical school of the village, giving, amongst other work, practical and theoretical instruction on the greatest of all industries—agriculture.

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#### Avogadro's Hypothesis (or Law).

IN Prof. Tilden's "Life of Mendeléeff" in the current number of the Journal of the Chemical Society, I see that he refers repeatedly to the "law" of Avogadro. Sir William Ramsay, in his "Modern Chemistry," speaks of it as a "hypothesis," and this has surely been, until recently, the practice of chemists.

I think there is a growing tendency to speak of it as a law. This, doubtless, arises from the strong confirmatory evidence provided by modern physical chemistry. It is desirable, in the interests of students and of exactitude in scientific nomenclature, that some decision should be come to as to which term should be used. This may necessitate very careful definition.

A discussion of this matter, in which teachers will give reasons for their choice, should prove of value.

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#### "A Japanese Priest in Tibet."

WHATEVER may be the demerits of Mr. Kawaguchi's "Three Years in Tibet," reviewed in NATURE of January 13, the title of the book is, according to the Eastern habit of reckoning, quite accurate. Mr. Kawaguchi spent part of 1900, all 1901, and part of 1902 in Tibet—three years. A child in Japan, if born on December 31, begins his second year on January 1, and on the succeeding New Year's Day may be regarded as having lived for three years, although he may be only 367 days old!

C. G. KNOTT.

University of Edinburgh, January 17.

#### STANDARD MEASUREMENT IN WAVE-LENGTHS OF LIGHT.

THE employment of the principle of the interference of two rays of monochromatic light, derived from the same source, one retarded behind the other by having to traverse a longer path, for the production of rectilinear interference bands constituting a scale of half-wave-lengths, has now been brought to such perfection that this highly refined scale may be used for the measurement of short distances or small movements of any description whatsoever. The accuracy is absolute to the tenth part of a scale division, the twentieth part of a wave-length of light, and is actually measurable with the most ordinary micrometer to the one-hundredth of a scale division, corresponding to the two-hundredth part of a wave-length. Now a wave-length of even the grossest radiations employed, those of red light, derived from either cadmium vapour (0.0006438 mm.) or hydrogen (0.0006562 mm.), is a forty-thousandth of an inch, so that the measurable unit is an eight-millionth part of an inch.

The finest trustworthy measurement by mechanical means (such as the Whitworth machine) or micrometric devices (such as the most refined thickness measurer) is the one-thousandth of a millimetre, or the twenty-five-thousandth of an inch. Moreover, the amount of possible error with either of these mechanical methods of measurement or the interference method is from one to two units of the respective scales. Hence the interference method is only subject to a possible error of one three-hundred-and-twentieth the magnitude of that to which the mechanical mode of measurement is liable.

The interference method was first seriously employed by Fizeau, who utilised it for the determination of the thermal expansion of crystals and other small bodies. It was materially improved by Abbe and Pulfrich, and more recently both for the same crystallographic purpose and for general purposes by the writer, who has also extended its use to the measurement of the modulus of elasticity of crystals and small bodies or small quantities of substances in general.

It will be remembered also that Prof. Michelson, of Chicago, has recently adapted his entirely different mode of producing interference fringes, in this case circular, to the determination of the number of wave-lengths of red cadmium light, which he has proved to be the most homogeneous of all radiations yet known to us, in the French metre. By employing a graduated series of glass-plate *étalons* or intermediate standards, each double of the preceding one, commencing with a basal one of half a millimetre in which the actual number (1212) of half-wave-lengths was counted, the number of wave-lengths of red cadmium light in the metre was eventually found to be 1,553,163. This number has since been confirmed by the independent method of Fabry and Perot, in which circular fringes are also produced.

Three years ago the writer was invited by the Standards Department of the Board of Trade to adapt